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What is Claimed is:

1. An electrical circuit in a communications channel comprising:

5 an active resistive summer including:

an input for a composite signal, the composite signal including a transmission signal component and a receive signal component;

an input for a replica transmission signal; and

10 an output for a receive signal which comprises the composite signal minus the replica signal.

2. The electrical circuit according to Claim 1, wherein said active resistive summer includes an  
15 operational amplifier.

3. The electrical circuit according to Claim 1, wherein said active resistive summer includes an operational amplifier having a positive input terminal, a  
20 negative input terminal, and an output terminal, said active resistive summer further comprising:

a feedback element in communication with the output terminal and the negative input terminal;

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a first resistor in communication with the negative input terminal and the composite signal; and

a second resistor in communication with the negative input terminal and the replica transmission  
5 signal.

4. The electrical circuit according to Claim 3, wherein the replica transmission signal comprises a high pass signal.

10

5. The electrical circuit according to Claim 3, wherein the replica transmission signal comprises a negative replica transmission signal as a first signal and a low pass replica transmission signal as a second signal,  
15 and wherein the second resistor comprises a third resistor and a fourth resistor, and wherein the third resistor is in communication with the first signal and the negative input terminal and the fourth resistor is in communication with the second signal and the negative input terminal.

20

6. The electrical circuit according to Claim 3, wherein the active resistive summer further comprises an input for receiving a current for baseline correction.

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7. The electrical circuit according to Claim 6, further comprising a charge pump to control the current for the baseline current.

5           8. The electrical circuit according to Claim 7, wherein the charge pump controls current based on an error between an equalized baseline signal and a sliced baseline signal.

10           9. The electrical circuit according to Claim 6, wherein the active resistive summer further comprises an input to receive a common-mode shift current.

15           10. An electrical circuit in a communications channel comprising:

          means for summing including:

          means for inputting a composite signal, the composite signal including a transmission signal component and a receive signal component;

20           means for inputting a replica transmission signal; and

          means for outputting a receive signal which comprises the composite signal minus the replica signal.

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11. The electrical circuit according to Claim 10, wherein said summing means includes means for amplifying.

5

12. The electrical circuit according to Claim 10, wherein said summing means comprises means for amplifying including a positive input terminal, a negative input terminal, and an output terminal, said summing means further comprising:

feedback means for communicating with the output terminal and the negative input terminal;

first resistive means for communicating with the negative input terminal and the composite signal; and

15 second resistive means for communicating with the negative input terminal and the replica transmission signal.

20 13. The electrical circuit according to Claim 12, wherein the replica transmission signal comprises a high pass signal.

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14. The electrical circuit according to Claim 12, wherein the replica transmission signal comprises a negative replica transmission signal as a first signal and a low pass replica transmission signal as a second signal, and wherein the second resistive means comprises a third resistive means and a fourth resistive means, and wherein the third resistive means is for communicating with the first signal and the negative input terminal and the fourth resistive means is for communicating with the second signal and the negative input terminal.

15. The electrical circuit according to Claim 12, wherein the summing means further comprises means for receiving a current for baseline correction.

16. The electrical circuit according to Claim 15, further comprising means for pumping to control the current for the baseline current.

17. The electrical circuit according to Claim 16, wherein the pumping means controls current based on an error between an equalized baseline signal and a sliced baseline signal.

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18. The electrical circuit according to Claim 15, wherein the summing means further comprises means for receiving a common-mode shift current.

5

19. A method of reducing a transmission signal from a composite signal in a communications channel comprising the steps of:

inputting the composite signal into an active resistive summer, the composite signal including the transmission signal component and a receive signal component;

inputting a replica transmission signal into the active resistive summer; and

outputting a signal from the active resistive summer which comprises the composite signal minus the replica transmission signal.

20. The method according to Claim 19, wherein the active resistive summer includes an operational amplifier.

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21. The method according to Claim 19,  
wherein the active resistive summer includes an operational  
amplifier having a positive input terminal, a negative  
input terminal, and an output terminal, the active  
5 resistive summer further comprising:

a feedback element in communication with the  
output terminal and the negative input terminal;

a first resistor in communication with the  
negative input terminal and the composite signal; and

10 a second resistor in communication with the  
negative input terminal and the replica transmission  
signal.

22. The method according to Claim 21, wherein  
15 the replica transmission signal comprises a high pass  
signal.

23. The method according to Claim 21, wherein  
the replica transmission signal comprises a negative  
20 replica transmission signal as a first signal and a low  
pass replica transmission signal as a second signal, and  
wherein the second resistor comprises a third resistor and  
a fourth resistor, and wherein the third resistor is in  
communication with the first signal and the negative input

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terminal and the fourth resistor is in communication with the second signal and the negative input terminal.

24. The method according to Claim 23, further  
5 comprising a step of inputting a current into the active resistive summer to correct baseline wander.

25. The method according to Claim 24, further  
comprising a step of controlling the current for correcting  
10 the baseline wander with a charge pump.

26. The method according to Claim 25, wherein  
the charge pump controls current based on an error between  
an equalized baseline signal and a sliced baseline signal.  
15

27. The method according to Claim 24, further  
comprising a step of inputting a common-mode shift current  
into the active resistive summer.

20 28. A transmit canceller in a communication channel, the channel including a first transceiver for transmitting and receiving signal and a replica transmitter for generating an input replica transmission signal, a composite signal at a near end

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comprising a transmission signal of the first transceiver and a signal received from a second transceiver, said transmit canceller comprising:

an operational amplifier having a positive input terminal, a negative input terminal, and an output terminal;

a feedback element in communication with the negative input terminal and the output terminal;

a first input resistor in communication with the negative input terminal and the measured signal input;

a second input resistor in communication with the negative input terminal and the replica signal input; and

a predetermined voltage source in communication with the positive terminal of the operational amplifier,

wherein the received signal is an output at the output terminal of the operational amplifier.

29. The transmit canceller according to Claim 28, further comprising a connection between a baseline correction current source and the negative input terminal.

30. The transmit canceller according to Claim 29, further comprising a charge pump to control the baseline correction current source.

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31. The transmit canceller according to Claim  
30, wherein the charge pump controls the baseline  
correction current source based on an error between an  
5 equalized baseline signal and a sliced baseline signal.

32. The transmit canceller according to Claim  
29, further comprising a connection between a common-mode  
shift current source and the negative input terminal.

10

33. The transmit canceller according to Claim  
28, wherein the replica signal comprises a high pass  
signal.

15

34. The transmit canceller according to Claim  
28, wherein the replica signal comprises a negative signal  
and the transmit canceller further includes a third  
resistor in communication with the negative input terminal  
and a low pass positive replica signal input.

20

35. The transmit canceller according to Claim  
28, wherein the communication channel comprises a gigabit  
channel.

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36. A transmit canceller in a communication channel, the channel including a first transceiver for transmitting and receiving signal and a replica transmitter for generating an input replica transmission signal, a  
5 composite signal at a near end comprising a transmission signal of the first transceiver and a signal received from a second transceiver, said transmit canceller comprising:

means for amplifying including a positive input terminal, a negative input terminal, and an output  
10 terminal;

feedback means for communicating with the negative input terminal and the output terminal;

first means for communicating with the negative input terminal and the measured signal input;

15 second means for communicating with the negative input terminal and the replica signal input; and

means for supplying a predetermined voltage to the positive terminal of the operational amplifier,

wherein the received signal is an output at the  
20 output terminal of the amplifying means.

37. The transmit canceller according to Claim

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36, further comprising means for correcting baseline wander.

38. The transmit canceller according to Claim  
5 37, further comprising means for pumping to control the baseline correcting means.

39. The transmit canceller according to Claim  
38, wherein the means for pumping controls the baseline  
10 correction means based on an error between an equalized baseline signal and a sliced baseline signal.

40. The transmit canceller according to Claim  
37, further comprising means for connecting a common-mode  
15 shift current source and the negative input terminal.

41. The transmit canceller according to Claim  
36, wherein the replica signal comprises a high pass  
signal.

20

42. The transmit canceller according to Claim  
36, wherein the replica signal comprises a negative signal  
and the transmit canceller further includes a third means

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for communicating with the negative input terminal and a low pass positive replica signal input.

43. The transmit canceller according to Claim  
5 36, wherein the communication channel comprises a gigabit channel.

44. A method of reducing a transmission signal  
from a composite signal in a communication channel, the  
10 channel including a first transceiver for transmitting and receiving signals and a replica transmitter for generating an input replica transmission signal, the composite signal at a near end comprising a transmission signal of the first transceiver and a signal received from a second  
15 transceiver, said method comprising the steps of:

providing an operational amplifier having a positive input terminal, a negative input terminal, and an output terminal;

arranging a feedback element to be in  
20 communication with the negative input terminal and the output terminal;

arranging a first resistive element to be in communication with the negative input terminal and the measured signal input;

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arranging a second resistive element to be in communication with the negative input terminal and the replica signal input;

arranging a predetermined voltage source to be in communication with the positive terminal of the operational amplifier; and

outputting a signal at the output terminal that reduces the transmission signal.

10           45. The method according to Claim 44, further comprising a step of connecting a baseline correction current source to the negative terminal of the operational amplifier.

15           46. The method according to Claim 45, further comprising a step of controlling the baseline correction current source with a charge pump.

20           47. The method according to Claim 46, wherein the charge pump controls the baseline correction current source based on an error between an equalized baseline signal and a sliced baseline signal.

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48. The method according to Claim 45, further comprising a step of connecting a common-mode shift current source to the negative input terminal to control a common-mode voltage of the operational amplifier.

5

49. The method according to Claim 44, wherein the replica signal comprises a high pass signal.

50. The method according to Claim 44, wherein  
10 the replica signal comprises a negative signal and the transmit canceller further includes a third resistive element in communication with the negative input terminal and a low pass positive replica signal input.

15 51. The method according to Claim 44, wherein the communication channel comprises a gigabit channel.

52. A communication system including a first transmission channel with a first end and a second end, the  
20 first end coupled to a first transformer and the second end coupled to a second transformer, a first end transceiver transmitting and receiving signals via the first transformer and a second end transceiver transmitting and receiving signals via the second transformer, a first

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signal being supplied at the first end, the first signal comprising a transmission signal component of the first transceiver and a receive signal component from the second transceiver, said communication system comprising:

5           a replica transmitter that generates a replica of the transmission signal component of the first transceiver;  
          a filter to filter the replica signal; and  
          an active resistive summer receiving the first signal, and the filtered replica signal as inputs, to  
10       reduce the transmission signal component at an output of the active resistive summer.

53. The communication system according to Claim 52, wherein said active resistive summer includes an  
15       operational amplifier.

54. The communication system according to Claim 52, wherein said active resistive summer includes an operational amplifier having a positive input terminal, a  
20       negative input terminal, and an output terminal, said active resistive summer further comprising:

          a feedback element in communication with the output terminal and the negative input terminal;

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a first resistor in communication with the negative input terminal and the first signal; and

a second resistor in communication with the negative input terminal and the filtered replica signal.

5

55. The communication system according to Claim 54, wherein the active resistive summer receives an inverted replica signal as an input, and wherein a third resistor is in communication with the inverted replica  
10 signal and the negative input terminal.

56. The communication system according to Claim 55, wherein the active resistive summer includes an input for baseline correction current.

15

57. The communication system according to Claim 56, further comprising a charge pump that controls the current for the baseline current.

20

58. The communication system according to Claim 57, wherein the charge pump controls current based on a digital error between an equalized baseline signal and a sliced baseline signal.

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59. The communication system according to claim 56, wherein the active resistive summer includes an input for common-mode shift current.

5 60. A communication system including a first  
transmission channel with a first end and a second end, the  
first end coupled to a first transformer and the second end  
coupled to a second transformer, a first end transceiver  
transmitting and receiving signals via the first  
10 transformer and a second end transceiver transmitting and  
receiving signals via the second transformer, a first  
signal being supplied at the first end, the first signal  
comprising a transmission signal component of the first  
transceiver and a receive signal component of the second  
15 transceiver, said communication system comprising:

means for replicating the transmission signal  
component of the first transceiver;

means for filtering an output of the replicating  
means; and

20 means for summing the first signal and an output  
of the filtering means to reduce the transmission signal at  
an output of the summing means.

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61. The communication system according to Claim 60, wherein said summing means includes means for amplifying.

5 62. The communication system according to Claim 60, wherein said summing means includes means for amplifying having a positive input terminal, a negative input terminal, and an output terminal, said summing means further comprising:

10 feedback means for communicating between the output terminal and the negative input terminal;

first resistive means for communicating between the negative input terminal and the first signal; and

15 second resistive means for communicating between the negative input terminal and the filtered replica transmission signal component.

63. The communication system according to Claim 62, wherein the summing means further sums an inverted  
20 replica transmission signal component, and wherein a third resistor is in communication with the inverted replica transmission signal component and the negative input terminal.

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64. The communication system according to Claim 63, wherein the summing means includes means for receiving a baseline correction current.

5

65. The communication system according to Claim 64, further comprising means for controlling the current for the baseline current.

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66. The communication system according to Claim 65, wherein the pumping means controls current based on a digital error between an equalized baseline signal and a sliced baseline signal.

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67. The communication system according to claim 64, wherein the communication system includes means for controlling common-mode voltage.

20

68. A method in a communication system including a first transmission channel with a first end and a second end, the first end coupled to a first transformer and the second end coupled to a second transformer, a first end transceiver transmitting and receiving signals via the first transformer and a second end transceiver transmitting

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and receiving signals via the second transformer, a first signal being supplied at the first end, the first signal comprising a transmission signal component of the first transceiver and a receive signal component of the second transceiver, said method comprising the steps of:

generating a replica of the transmission signal component of the first transceiver;

filtering the replica signal; and

summing with an active resistive summer the first signal and the replica signal to reduce the transmission signal at an output of the active resistive summer.

69. The method according to Claim 68, wherein the active resistive summer includes an operational amplifier.

70. The method according to Claim 68, wherein the active resistive summer includes an operational amplifier having a positive input terminal, a negative input terminal, and an output terminal, said active resistive summer further comprising:

a feedback element in communication with the output terminal and the negative input terminal;

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a first resistor in communication with the negative input terminal and the first signal; and

a second resistor in communication with the negative input terminal and the filtered replica

5 transmission signal.

71. The method according to Claim 70, wherein the active resistive summer sums an inverted replica transmission signal component, and wherein the third  
10 resistor is in communication with the inverted replica transmission signal component and the negative input terminal.

72. The method according to Claim 71, further  
15 comprising the step of inputting baseline correction current into the active resistive summer.

73. The method according to Claim 72, further comprising a step of controlling the baseline current with  
20 a charge pump.

74. The method according to Claim 73, wherein the charge pump controls current based on an error between an equalized baseline signal and a sliced baseline signal.

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75. The method according to claim 72, further comprising the step of inputting a common-mode shift current into the active resistive summer to control a common-mode voltage of the operational amplifier.

76. A method of reducing a transmission signal from a composite signal in a communication channel, the channel including a first transceiver and a second transceiver each to transmit and receive signals, said method comprising the steps of:

providing the composite signal, the composite signal comprising the transmission signal of the first transceiver and a receive signal of the second transceiver;

generating a replica of the transmission signal;

and

subtracting the replica signal from the composite signal through an active resistive summer.

77. The method according to Claim 76, further comprising the step of correcting baseline wander by inputting a baseline correction current into the active resistive summer.

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78. The method according to Claim 77, further comprising the steps of controlling a common-mode voltage of the active resistive summer by inputting a common-mode shift current into the active resistive summer.

5

79. A method of correcting baseline wander in a receive signal in a communications channel having a near end and far end, the channel including a first transceiver at the near end and a second transceiver at the far end each to transmit and receive signals, said method comprising the steps of:

10

providing a composite signal, the composite signal comprising a transmission signal of the first transceiver and a receive signal of the second transceiver;

generating a replica of the transmission signal;

subtracting the replica signal from the composite signal through an active resistive summer; and

15

providing a baseline correction current as an input to the active resistive summer.

20

80. The method according to Claim 79, further comprising the step controlling the baseline correction current with a charge pump.

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81. The method according to Claim 80, further comprising the step of pumping the charge pump based on an error between an equalized baseline signal and a sliced baseline signal.

5

82. An apparatus to correct baseline wander in a receive signal in a communications channel having a near end and far end, the channel including a first transceiver at the near end and a second transceiver at the far end each to transmit and receive signals, said apparatus comprising:

a replica transmitter to generate a replica of the transmission signal; and

an active resistive summer to subtract the replica signal from a composite signal, the composite signal comprising a transmission signal of the first transceiver and a receive signal of the second transceiver, said active resistive summer including:

a first input to receive the composite signal;

a second input to receive the replica of the transmission signal; and

a third input to receive a baseline correction current.

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83. The apparatus according to Claim 82, further comprising a charge pump to control the baseline correction current.

5 84. The apparatus according to Claim 83, wherein the charge pump controls the baseline correction current based on an error between an equalized baseline signal and a sliced baseline signal.

10 85. An apparatus to correct baseline wander in a receive signal in a communications channel having a near and far end, the channel including a first transceiver at the near end and a second transceiver at the far end each to transmit and receive signals, said apparatus comprising:

15 means for providing a composite signal, the composite signal comprising a transmission signal of the first transceiver and a receive signal of the second transceiver;

means for generating a replica of the  
20 transmission signal;

means for subtracting the replica signal from the composite signal; and

means for providing a baseline correction current as an input to the subtracting means.

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86. The method according to Claim 85, further comprising pumping means for controlling the baseline correction current.

5

87. The method according to Claim 86, wherein the pumping means controls the baseline correction current based on an error between an equalized baseline signal and a sliced baseline signal.

10

88. An electrical circuit for reducing a transmission signal comprising:

an active resistive summer having an operational amplifier that includes a positive input terminal, a negative input terminal, and an output terminal, said active resistive summer further comprising:

a feedback element in communication with the output terminal and the negative input terminal;

a first resistor in communication with the negative input terminal and a composite signal, the composite signal having a transit signal component and a receive signal component; and

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a second resistor in communication with the negative input terminal and a replica of the transmit signal.

5            89.. An electrical circuit for reducing a transmission signal comprising:

means for active summing including a positive input terminal, a negative input terminal, and an output terminal, said active summing means further comprising:

10           feedback means for communicating with the output terminal and the negative input terminal;

means for communicating with the negative input terminal and a composite signal, the composite signal having a transit signal component and a receive signal

15           component; and

means for communicating with the negative input terminal and a replica of the transmit signal.

20           90. Apparatus for reducing transmission noise in a communications channel, comprising:

an input to receive a near end transmit signal;

an input to receive a far end receive signal;

an input to receive a replica of transmission noise in the transmit signal; and

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a summer connected to all three inputs and providing an output which reduces the transmission noise of the transmit signal.

5           91. The apparatus according to Claim 90, further comprising a replica signal generator to provide the replica to the replica input.

10           92. The apparatus according to Claim 91, wherein the summer comprises an operational amplifier.

93. Apparatus for reducing transmission noise in a communications channel, comprising:

means for receiving a near end transmit signal;

15           means for receiving a far end receive signal;

means for receiving a replica of transmission noise in the transmit signal; and

means for summing all three inputs and for providing an output which reduces the transmission noise of  
20 the transmit signal.

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94. The apparatus according to Claim 93, further comprising means for generating a replica signal and for providing the replica to said means for receiving a replica.

5

95. The apparatus according to Claim 94, wherein the summing means comprises means for amplifying.